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TENOTOMY

IN

CONGENITAL VARUS.

BY

THOS. F. CULLEN, M. D.

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ITS INUTILITY IN

CONGENITAL VARUS.

By THOS. F. CULLEN, M. D.

Extracted from Transactions of the Medical Society of N. J., 1868.

NEWARK, N. J.:
EVENING COURIER PRINT, 309 BROAD STREET.
1868.

ESSAY.

THE INUTILITY OF TENOTOMY IN THE TREATMENT OF CONGENITAL VARUS.

BY THOS. F. CULLEN, M. D.

Mr. President and Gentlemen of the Medical Society of New Jersey:

Established custom appears to demand an essay, in some form, even from the Third Vice President, on such anniversaries as the present; and I bow to the necessity with a feeling of diffidence, rather than exultation. The production of an essay before a learned body is, under all circumstances, a formidable undertaking, even to those who have already reached *eminence among the eminent;* but *here*, and *before you*, it is especially so. Meeting as we do, almost within the shadow of the classic groves of Princeton, where so many of the good and great who have done honor to our country and their species, began their literary and scientific labors, crowning their young brows with budding laurels, where so many of you now present prepared yourselves by elementary studies for entering upon the deeper mysteries of the profession to which you have lived to add so much lustre;—assembled on a spot rendered sacred in history by the struggle which secured our national existence, with the echoes of Revolutionary cannon still floating around us, and the hallowed voices of our self-devoted fathers still breathing in our ears the eloquent lessons of the days that tried men's souls; *here*, and before you, the essayist feels his task peculiarly difficult. With everything around him, both in the present and

the past, to excite ambition and stimulate imagination, the nature of his subject, binds him to the rugged path of science. To be useful, must be his highest aspiration. To revel among the flowers of rhetoric, to mount on strong pinions towards the heights of eloquence, even to sport by the wayside with the gems of literature—all this would be impertinent, even if his humble powers would warrant such an attempt. The advancement and effective proof of a simple fact in Medicine or Surgery is more correctly in his line of duty on this occasion than the happiest display of erudition or literary accomplishment. Accordingly, I have chosen for my subject at this time, "*The Inutility of Tenotomy in the Treatment of Congenital Varus.*"

The propriety of tenotomy in cases of deformity, as a general question, has been warmly argued between surgeons of high distinction from an early period, the operation alternately rising and sinking in popularity like other fashions in medicine. Of late years within our memory, there has been a period in which such operations were carried to an unwarranted excess, and frequently with very unfortunate results; there followed an interval of years during which its enemies proved victorious to a considerable extent, and it fell into, perhaps, unmerited neglect. Recently this discussion has been renewed with more vigor, and we are in danger I think of going once more into the former extreme. The dispute is probably, like that of the two travelers, as to the color of the chameleon, the truth being determined rather by surrounding circumstances or the nature of the deformity in each class of cases, than by the intrinsic merits of the operation. I am far from wishing to be understood as an opponent of tenotomy in all deformities, even while presenting both argument and practical evidence against its employment in congenital varus; to which my attention will be confined at present as closely as possible.

Presuming that all are acquainted with the history of tenotomy in varus, from the time of Thilenius, in 1784, to the present moment, and with the counter evidence and reasonings of the equally

distinguished friends of the exclusively mechanical treatment of this deformity, your Essayist takes ground that in congenital varus, the division of tendons or muscles, only complicates the case, and prevents at least for a time, the application of instruments proper for the reduction of the deformity;—instruments, be it remembered, that are always requisite, whether tenotomy be performed or not:—for no sane surgeon will dare to assert that, unaided, muscular contraction can restore the displaced parts to their normal position, even after all opposing tendons are divided; and I hold that this restoration may be far more perfectly effected by the proper mechanical agents, *without the operation.* Much has been said of the proximate cause of this deformity; but I am not aware that any fact has been discovered, or that any thing even plausibly hypothetical on this point has ever been advanced, but we do know, unfortunately too well, the actual condition of the foot, in such cases; the peculiar malformation and serious distortion of the bones of the tarsus, metatarsus and ankle, with the corresponding arrangement of the muscles and tendons. From these well established data, your essayist is irresistibly forced to the conclusion that the muscles have no effect in producing the deformity, but that they merely accommodated themselves to the altered condition of the osseous structure, resulting from unknown and abnormal actions on the partially developed limb, while the child is *in utero*, whether those actions be mechanical—from aberrations in the contractions of uterine fibre, or temporary malposition of the fœtus. or physiological, from errors in the process of nutrition. It is well known that the very great change in the form of the foot results from alteration in the shape and relative positions of the astragulus, the os naviculare, and the internal, middle, and external cunieform bones; and that in consequence of this change, the weight of the child, when placed in an erect attitude, is brought to bear upon the os cuboides, (which is often enlarged,) and upon the heads of the fourth and fifth metatarsal bones. At birth, as Dr. Horner very

properly remarks, though the skeleton is sufficiently solid to preserve the shape of the individual, yet it remains very imperfect in many particulars. The ends of the long bones are still cartilaginous, and all parts of the carpus and tarsus are nearly in the same condition, presenting only very delicate and minute centres of ossification, bearing but slender proportion to the entire dimensions of the several bones; which therefore present, as yet, no sufficient *points d' appui* for the vigorous action of muscles, even if the tender infantile fibres were capable of such action. Now I contend that, under such circumstances the muscles can have nothing whatever to do with the production of the formidable alterations of structure and position that constitutes the varus; and if correct, in this, what possible good result can follow the division and subsequent reunion of muscle or tendon? I hold that there is none. Even adult muscles slowly accommodate themselves to considerable permanent extension; as is evidenced in the history of irreducible luxations with elongation of the limb; and it is not to be believed that the tender fibres of an infant can offer any effective opposition to a gentle, but persistent action of mechanical force. The obstacle to the restitution of the bones to their proper relative position in this deformity, is not to be found in muscular resistance, but in the actual changes of form in the osseous and ligamentous structure; and these are to be counteracted not by tenotomy but by the gradual remolding of tissue, effected by time, under the influence of mechanical pressure, and certain well known physiological powers, such as we sometimes see developed in the formation of new joints after dislocations of the shoulder or hip.

In varus the articulations, ligamentous connections, and the bones themselves are changed, not only in position but in form; and our special duty is to bring gradually the parts to such relations as will restore them as nearly as possible to their capacity for the performance of their normal functions, through the agency of the plastic powers of the vital organization which we see so remarkably exemplified in the production of the very malformations that

we seek to remedy. This very cursory review of the subject being premised, and your patience demanding brevity, it would seem desirable now to enter at once upon the consideration of the proper method of treating this deformity, and the appropriate time for its commencement.

I have made it a rule in my own practice to commence the application of apparatus as soon after birth as the parts are sufficiently developed to bear the application of the splint intended to produce eversion of the foot without producing abrasion; and I have found the proper age to vary from six weeks to three or four months; but even at an earlier period a systematic and cautious course of treatment is not to be neglected. From the first, the nurse should be taught to bring the foot repeatedly and carefully to the median line of the leg, by gentle manipulation; for this will be found to facilitate the after operations, and ultimate success in a remarkable degree.

The first instrument to be employed in changing the relations of the parts was called by its inventor, the late Heber Chase, M. D., of Philadelphia, "the Everter." [See Figs. 1 and 2.] It consists of a brass splint, moulded to the general form of the outside of the leg, and well padded to its lowest extremity, which terminates just above the external malleolus, to which is appended a projecting flat rod of soft steel, provided with three fenestra, longitudinally arranged, for the accommodation of straps. This bar is connected with the brass splint by a malleable neck, round in form, and one inch in length, which permits it to be easily bent in any direction, at the will of the surgeon. This neck is prevented from pressing on the external malleolus with which it corresponds in position, by the thickness of the padding of the splint. This splint is applied to the limb, from opposite the head of the fibula to the malleolus, and it is secured in that position by a roller. The neck of the instrument is then bent till the flat steel rod is brought to an angle with the splint, somewhat more obtuse than that formed between the leg and distorted foot. [See Fig. 1.]

And the latter is everted and held in a line with the steel bar, either by a few turns of narrow roller, or what is preferable, soft leather straps passed through the fenestra. The foot should be examined from day to day, and the instrument re-adjusted when necessary; and, as the resulting change of position of bones progresses, the direction of the steel bar should be gradually altered, until the foot is brought into a straight line with the spine of the tibia. It then becomes advisable to keep things in *statu quo* for two or three weeks, to favor the required absorption of the soft bones of *the outside* of the foot, while the reparatory process is going on upon the *inner side.* The eversion should *then* be steadily continued until the foot is rotated outward, to an angle of thirty degrees, as shown by instrument. [See Fig. 2.]

In the management of very delicate children, where the parents are extremely anxious to have the treatment to be commenced, at a very early age, I have used with very happy effect, an instrument of my own projection. It differs from "Chase's Everter" in having substituted for the flat steel bar of that apparatus, a second brass splint, adapted by padding and moulded to the form of the outside of the foot, together with about half the plantar and dorsal surfaces of the tarsal and metatarsal regions in their deformed condition; the two splints being connected by a flexible neck as in the former contrivance. [See Figs. 3 and 4.] This instrument is at first arranged at an angle rather more obtuse than that of the foot and leg, and is secured to the limb after adjustment, by means of a roller applied over a well regulating padded, both to the foot and leg. The foot is then from day to day, cautiously brought into line with the spine of the tibia, as in the foregoing plan of treatment; but without the same forcible action on the smaller bones affected by the unnatural torsion that gives character to the deformity. Some weeks are allowed, as in the former case, for the natural processes of absorption and the remodeling of bone; and then rotation of the foot outward is continued until the eversion is complete, and the foundation of a proper pedal sup-

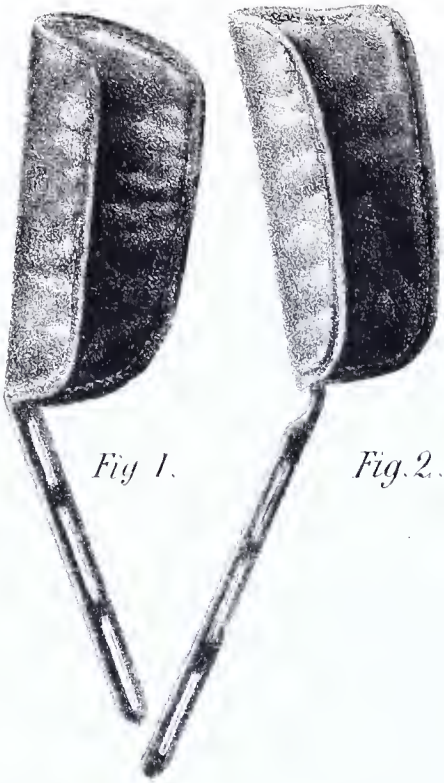

Fig 1.

Fig. 2.

Fig 3

Fig. 4.

Fig. 7.

Fig. 8.

Fig. 11.

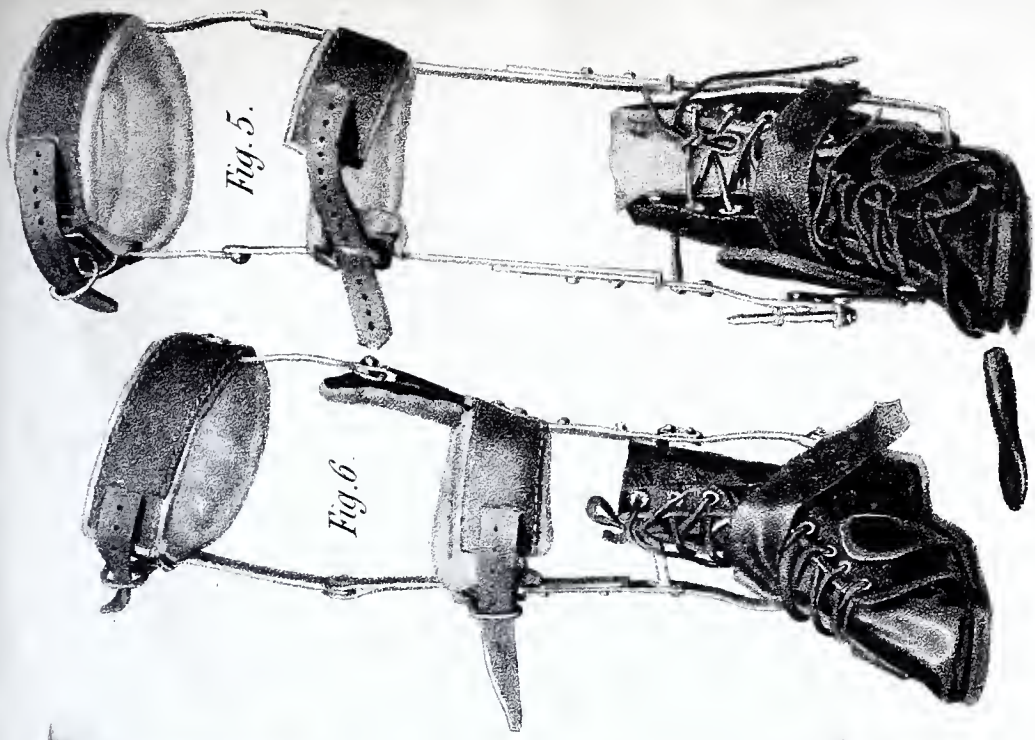

Fig. 5.

Fig. 6.

Fig. 9.

Fig 10.

Fig. 12.

M H Traubel lith Philad.a

port is effectually procured and maintained. This instrument I have applied as early as six weeks after the birth of the child.

During the process of eversion and its maintenance, and until the child is old enough to attempt to walk, nothing more is needed except careful manipulations of the foot, to favor freedom of flexion and extension; and it is the firm belief of your essayist that if these plans were carried out properly, no other treatment would be found necessary in very many cases of congenital varus; for, if proper watchfulness were observed, every step that a child takes, or attempts, after the foot has been fully everted and time has been allowed for the completion of the consequent absorption and remodeling of osseous and ligamentous tissue, tends to reduce the foot to its natural position, and secure the normal exercise of its functions. But this degree of caution is too great to be expected of even the anxious solicitude of the most faithful mother in many conditions of social life; and we are therefore compelled to resort to mechanical means other than the human hand, though aided by parental authority, in order to control the effects of childish indiscretion, and secure the proper freedom of flexion and extension, while preserving that amount of eversion which is the *sine qua non* of permanent success. To fulfil these necessities we know of no better resource than that which is furnished by the *splint* and *shoe* with *stationary heel* and *moveable sole*, introduced by D. W. Kolbe, of Philadelphia, which is undoubtedly superior to any other contrivance that has fallen under my observation. It consists of two side splints of steel well moulded to the external and internal portions of the lower extremity, from the middle of the thigh to the foot, and having moveable joints at the knee and ankle. These splints are conjoined by arched bands to fit the posterior position of the limb, and by a cross-bar to which a shoe of ingenious construction is attached. In this instrument the motion of the moveable sole effectually maintains the eversion of the foot, while this movement and that designed for the flexion of the

ankle being entirely distinct, and under control of separate mechanisms, is yet capable of combination under any necessity.

The apparatus with its ingenious bearings and counter-bearings permits the child to take its initiative in walking with ease and perfect safety. [See Fig. 5.] So far as I am acquainted with Orthopœdic contrivances, I may truly aver that it is far superior for the purposes for which it is designed to any now in use, but it does not accomplish all that is claimed for it in making a good foot, unless the most perfect eversion is first effected. This last purpose, as I have before said, is a *sine qua non.* "To make haste slowly" is an excellent motto for one who would succeed in the treatment of congenital varus; and I am free to testify that I have seen better cures of this deformity, without the use of the knife, than I have ever witnessed when it has been employed, even by the most skillful operators.

I presume that the unfortunate appeals to the last resort of surgeons in varus have been, in a great degree, the results of too great haste, or too little patience. If we would succeed by the purely mechanical method of treatment, the patient must be kept under the eye of the practitioner until the whole of the osseous tissue of the foot is perfectly formed and developed, or at least until the earthy portions of bone are present in sufficient quantity to give each tarsal and metatarsal bone a local habitation and a name. Even after the foot has been brought into a good position, and the child has reached an age that permits it to walk freely with perfect ease to itself, proper caution requires the use of another apparatus. This instrument is like the one just described, except that it is without the mechanisms for the forcible eversion and flexion of the foot, and the shoe, which is open in front with eyelets for lacing from above the ankle to the toe, has a stiff sole which is fastened to the bottom cross-bar of the instrument, with the toe well everted, and provided with a steel arch bearing against the great toe joint, and a padded strap fastened to the sole of the shoe on the outer side, pressing against the cuboid, middle

and external cuneiform, and heads of the third, fourth and fifth metatarsal bones, and fastened to the internal splint opposite the os calcis. [See Figure 6.] The principal object of this apparatus is to keep secure the foot in a proper state of eversion, without embarassing the motions of flexion and extension, as the child exercises the function of the limb in walking. Its action constantly impresses on the wearer the necessity of keeping the toes well turned outward if he would apply the leg and foot to this natural use. It may appear somewhat pedantic to enter into much detail in the consideration of this well-known application; but when we call to mind the frequency of its occurrence in all parts of the country, and the extreme anxiety of parents concerning even the slightest defect of structure in their new-born infants, I trust I shall be pardoned for my fault, and the undue occupation of your time, if any such I may have committed; for who is the obstetrical practitioner that has not heard the fear-prompted cry of the mother almost in the last agonized wail of parturition. "Is the child all right?" Who has not felt a pang at witnessing the poignant grief of expectant parents, when after long months of ardent hope they are stricken down by the intelligence or perception of a deformity like this? If then this essay should, in any way, suggest to a single member of the profession a plainer path, or a more reliable method for the relief of a malformation so annoying to the friends and parents, and so serious in its consequences to the little sufferer itself, he who has trespassed for these few minutes on your kind attention will feel happy in the assurance that though he may not have accomplished all that the Society might have reasonably expected of him, he has done his best in his own humble way, to advance what he considers A TRUTH IN SURGERY: "THE INUTILITY OF TENOTOMY IN CONGENITAL VARUS."

In closing, your essayist begs leave to support the position he has assumed, by the assurance that during a professional experience of twenty-eight years as student and practitioner, he has treated or assisted in the treatment of some scores of cases of varus, and

has never yet witnessed an instance of success effected by the division of tendons or muscles, so complete as that which has followed its mechanical management, without the use of the knife. It would be wrong to detain a Society engaged in so many matters of the most serious importance, with details of numerous cases corroborative of his views; and he therefore takes the liberty of submitting for reference with this paper an Appendix, containing lithographs, carefully copied from photographs, of the apparatus advocated in the body of this discourse, and also of two cases occurring in one family in the city of Camden, treated by your essayist, as illustrations of the methods of treatment recommended.

Case 1st—B. G. K., aged 9 months. *Double Congenital Varus.* Eversion was commenced at this age, and completed by "Chases' Instrument" in *thirty days.* Flexion was commenced at a period about three months later. The child walked well at the age of sixteen months. [See Figures 7 and 8, representing casts of feet prior to treatment, and Figure 11, showing appearance of the feet of the child at eight and one-half years of age.]

Case 2d—J. L. K., brother of above, also *Double Congenital Varus.* The treatment pursued was similar to that of the former case, except that it was commenced at the early age of six weeks, and my own instrument for eversion was used. [See Figs. 9 and 10, representing casts of the feet at five and one-half weeks old.] The eversion was completed in twenty days, and the instruments for flexion and keeping up eversion were put on at the age of ten months. The child walked well when fourteen months old. [See Figure 12, representing the present condition of the feet of the child at three years of age.]

Thanking the Society most heartily for their indulgent attention, and trustfully hoping that each succeeding year may find us and our successors steadfastly engaged in the high and holy duty of promoting the progress of the divine art of healing, the honor of our STATE, our COUNTRY, and MANKIND, I have only to regret that my task had not been placed in abler hands.